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UNITED STATES OF AMERICA.

THE
SUGAR HAND BOOK:

A TREATISE ON

SUGAR CANES,

Treatment of Sugar Cane Juice,

AND THE

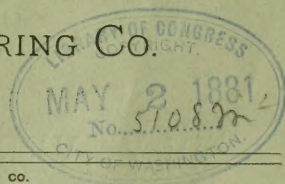
NECESSARY APPARATUS FOR MAKING SYRUP AND SUGAR.

By B. Blymyer David W.

CINCINNATI, O.:

BLYMYER MANUFACTURING CO.

1881.



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CHINESE AND AFRICAN SUGAR CANES:

VARIETIES, CULTURE, AND MANUFACTURE.

SORGO AND IMPHEE SUGAR CANES.

SORGO OR CHINESE SUGAR CANE. This cane, now so widely grown throughout the West and South, came originally from China, where it has been cultivated from a remote antiquity. It was unknown to the ancient Egyptians, Jews, Greeks, or Romans. Its first appearance in Europe was in 1851, at which time a quantity was sent, along with a collection of various plants and seeds, to France by the French Consul at Shanghai, China. A quantity of Sorgo seed was procured in Paris, in 1854, by D. J. Brown, Esq., of the United States Patent Office, and brought to the United States, where it was distributed by the Patent Office. In 1857 it was imported by the ton, and the general cultivation of Sorgo throughout the North and South was begun.

IMPHEES OR AFRICAN SUGAR CANES. The Imphee or African Sugar Cane came first from the south eastern coast of Africa. Mr. Leonard Wray, a well known American writer on Sugar Culture, during his stay at Natal, in the south eastern part of Africa, in 1851, found in cultivation there some fifteen varieties of the Imphee. He sent a quantity of the seed to France, about the time that Sorgo was first sent there from China. Thus the Sorgo and Imphees, from different quarters of the globe, reached France about the same time, and from thence were introduced into this country.

SORGO, APPEARANCE, ETC.

The cut herewith presented very accurately represents the appearance of the seed-head and seed of the Sorgo or Chinese Sugar Cane. The seed is shown full size, both naked and inclosed in its glumes. The stalk is tall and tapering, more slender than corn, and more graceful in appearance. It grows to the height of twelve to sixteen



feet or more. The stalk is not so thick as the Imphees. As the plant approaches maturity a whitish efflorescence appears upon the parts underneath the foot-stalks of the leaf. The time required for the full development of the Cane is about five months; but this depends of course largely upon the Soil, Climate, and Season. As the Cane approaches maturity the seed, which at first is a soft green pulp, changes in color, and finally becomes a dark purple or black.

IMPHEES, APPEARANCE, ETC.



The cuts show correctly the appearance of the seed head and seed of two of the Imphee or African Sugar Canes. The seed is represented both naked and as inclosed in its glumes. It will be noticed that the seed heads of the Imphees are much more compact than the Sorgo. The color of the Oomseeana seed is a dark brown, whilst that of the Liberian is a deep red. The Neeazana is another variety of the Imphee. It does not differ very widely in its appearance from the Liberian, but the seed is a cream or wood color. Of the fifteen varieties of the Imphee found at Natal by Mr. Wray,

only three have obtained a general introduction in this country—the Liberian, Neeazana, and Oomseeana. Of these the Liberian has been most generally successful. “The Neeazana,” says Mr. Wray, “was held by the Zulu-Kaffirs (natives of the South East Coast of Africa, from whence the different varieties of the Imphee were obtained) to be the sweetest of the Imphees; but I found the Oomseeana to be quite as sweet.”

BEST VARIETIES OF CANE.

Until within a few years past the Sorgo was generally given the preference by planters, but of late it has been losing favor in some localities, having lost in productiveness and quality. We don't hesitate to give the Liberian the preference over it. The latter has always been a heavy producer, but at first its syrup was regarded as inferior in quality to Sorgo. Its tendency, however, has been toward a marked improvement, until

now its yield is in general heavier and better in quality than *Sorgo*. The *Liberian* is also desirable for its freedom from disease. It has never been affected by mildew, rust, or blight of any kind. We therefore recommend it as upon the whole one of the most profitable varieties.

The *Neeazana* is a good *Imphee*, one of the best for syrup. In its general properties it resembles the *Liberian*; but it is peculiar in that it requires to be cut when still green, and to be worked up immediately after cutting. When thus treated it yields a pure and light colored syrup. In the extreme South it has greatly deteriorated, having lost in sweetness.

The *Oomseeana* is one of the best varieties of the *Imphee*, and is given the preference in some sections. It is good for sugar, but does not yield as largely in syrup as either the *Liberian* or *Sorgo*.

The four varieties of Cane named above are all standard and reliable, and when pure are well defined, and distinct in their appearance and properties. With the exception of the *Neeazana* there is but little difference in their relative adaptation to different latitudes, since although the *Sorgo* matures some two weeks earlier than the *Imphees*, the latter are ready for cutting earlier, and so the season is practically the same for each.

EARLY AMBER.

In appearance the *Early Amber* presents some of the characteristics of both *Sorgo* and *Imphee*. It grows quite tall, and yet not quite as tall as the *Sorgo*. Its heads are not so open and branching as the *Sorgo*, but are more open than either the *Liberian*, *Oomseeana*, or *Neeazana*. When fully matured the seed is but slightly enclosed in its glumes. It receives its name from its ripening early, and from the bright amber color which characterizes the syrup when properly made from it.

The accompanying cut very fairly illustrates the seed head, and seed inclosed in glumes of the *Minnesota Early Amber Cane*. This variety was first introduced to the country by the Hon. Seth H. Kenney, of Morristown, Minn., President *Minnesota Amber Cane Association*, and Mr. C. F. Miller, Dundas, Minn.

The *Early Amber* is very rich in saccharine matter; the syrup is of a beautiful, clear amber color and of a fine flavor, and when properly treated, produces a fine article of sugar.

The *Early Amber* is especially adapted to a high latitude from the fact that it is very early cane. It will ripen wherever flint corn will mature.

A new candidate for favor is the *EARLY ORANGE*, a very fine variety, introduced last season by Mr. I. A. Hedges, of St. Louis, Mo., President of the *Mississippi Valley Cane Growers Association*. It is especially adapted to the more Southern latitudes.



CANE CULTURE.

It is of the first importance to procure pure Cane seed of the best varieties. It is more profitable to pay for good seed even a high price than to take any other as a gift. Procure seed only from reliable dealers who are conversant with the different varieties, or from Cane growers whom you know to be reliable men, and whose Cane has produced good results in quantity and quality. Cane will deteriorate in a cold climate, and should be renewed from time to time with seed from Cane grown in a temperate climate, natural to its wants.

As all varieties of Sugar Cane will mix with each other and with Doura, Broom Corn, Chocolate Corn, and Millet, it is impossible to procure pure seed where they are grown together, or on adjacent lands. All admixture deteriorates the Cane. In selecting seed the richness of the juice is the proper test of quality. Land that will produce 40 bushels corn per acre ought to yield from 150 to 200 gallons syrup. The yield is often as high as 300 gallons per acre. Where the yield falls below 150 to 200 gallons it should be taken as an indication that the seed is impure. Of course the yield per acre depends not alone upon the seed; for soil, season, climate, and the percentage of waste in manufacture all unite in determining the quantity and quality of the syrup.

SOIL.

In general it may be said that Sorgo or the Imphees will thrive on any land that will produce a fair crop of corn or of wheat. The best results, however, can only be expected from soil adapted to the special wants of these Canes. Sandy upland soil is best, black bottom soil is worst. New land yields good syrup. Land freshly manured gives poor syrup. Clay land gives good syrup, but not so large a yield. The soil, unless rich, should be well manured in the Fall with vegetable or rotten stable manure. This is especially needed with clay lands. Plow deep and pulverize thoroughly. By throwing into ridges the soil will be better affected by frost in Winter, and will dry out sooner in the Spring. In general, prepare the ground as for corn.

PLANTING.

In sections where the Cane is liable to frost in the Fall, planting should be done early, as soon as the ground is thoroughly warm. Test the seed before time for planting, so that in the event of its proving worthless, you may have time to procure other seed. Plant in check rows, same as for corn, so as to plow both ways. Put in plenty of seed, and thin out so as to leave in the hill five or six stalks of the Minnesota Early Amber and

the Imphees, and six to seven stalks of Sorgo. This seed should be covered thinly. If planted early, one-half inch is deep enough, for if covered more than that, and the ground should become cold and wet, the seed will rot. If, however, the seed is planted *late*, when the ground is warm and comparatively dry, it should be covered one inch.

CULTIVATION.

As soon as the plant comes up destroy the weeds and keep clean until ready for the plow. It is especially important to give the plant every assistance in the early stages of its growth. It is a slow grower at first, and if left alone will be choked by weeds. This is the time to "make the crop."

Keep free from weeds. As soon as the rows can be followed stir the soil about the hills. When large enough, plow and cultivate same as corn. When about thirty inches high it may be turned out, as it is then able to take care of itself, and further plowing would only do damage by cutting the roots and injuring the stalks. The suckers should be pulled off, as they sap the strength of the Cane.

Cane should be cut when the seed is in the dough, and several days ahead of grinding, as it will be more free from impurities if cured for a few days before going to the mill. Top the Cane by cutting off one or two joints, then cut, and throw into windrows. After a week or ten days, if not wanted for immediate working up, the cane should be removed to shelter.

The cane should never be left to be overtaken by frost before it is cut, or it will be seriously injured. When a severe frost is threatened the Cane should be cut without stripping and laid in windrows.

The blades should not be stript until the Cane is wanted for grinding. By cutting before frost, and curing with blades on, the Cane may be kept for a month, or longer, without injury. It should be protected from rain and frost as much as possible. The tops should be laid in piles convenient for gathering, to dry, and may be left until the grinding is over.

Preserve the seed. It is worth by analysis one-sixth more than oats for stock feed. For sheep, feed on the head; and for other stock, grind the seed and make chop feed. The seed may be tramped or threshed out like wheat, or stript off like broom corn.

PREPARATION FOR THE MILL.

When ready for grinding, tie the Cane into bundles about eight inches in diameter, and haul to the mill. If not intended for use at once, cross pile the bundles, leaving suitable space for the circulation of air through the pile, or stand them up on ends, if by so doing it can be kept out of the dirt. Always feed the mill the butts entering first. It is better to strip the Cane as there will be less waste of juice then.

CANE JUICE,

DEFECATION, CONCENTRATION, SUGAR MAKING.

The process of sugar-making requires that the sugar existing in the cane shall be extracted and converted into solid bodies, leaving impurities behind. Experience has demonstrated that the more rapidly this is done, the better the results.

Immediately after the juice comes from the mill, the sugar must be freed from its surrounding impurities. Its quality will depend on the rapidity and skill with which this is done.

Cane juice, on account of the acids and perishable feculent matter it contains, begins to deteriorate the moment it is exposed to the air, and the tendency of this is to destroy crystalization and to convert true cane sugar into grape sugar or glucose. Care must therefore be taken, not to hold the juice in reservoirs, but to carry it at once from the mill to the boiling apparatus.

The tendency of the juice to acetous fermentation by contact with the air may be arrested by *sulphur fumigation*. The application of this is simple, but requires suitable appliances. Syrup and sugars thus treated are lighter in color and generally of superior quality. Fumigation, however, is not a necessity, although commonly practiced in sugar making.

The first requisite of real and in fact vital importance in the treatment of the juice as it leaves the mill is,

DEFECATION,

that is, the separation and cleansing from impurities held in it. Unless this is promptly secured, failure is certain. The rough stuff can be disposed of mechanically by some such device as strainer wire, or coarse cloth, or straw filter, but the *acids* and other impurities held in solution can be freed only by *chemical action* and *heat*.

In sugar countries, after vainly seeking a better method of neutralizing the acids, the most intelligent sugar makers have settled down to the use of lime alone. The application of lime requires care and judgment. It must be *pure* and *fresh*, not used in its caustic state, but slacked frequently during the day, being reduced to the consistency of milk of lime. The exact quantity to be used depends entirely on the amount of acid in the juice and must be determined by an experienced eye, or tests with litmus paper.

The judicious use of lime and heat in the early stages of defecation make up the most difficult points in sugar-making, and demands the greatest skill and attention. Lime and heat are the chief agents in defecation, but unless properly employed will impair and even prevent crystalization. Mistakes made in the application of these agents, especially in the first stages of the process, cannot afterwards be successfully remedied.

As, next to lime, *heat* performs the leading part in defecation, its effect depends upon its prompt application and proper distribution, as well as its withdrawal as required.

On account of the rapidity with which the juice changes from exposure to the air, it is important that all the process of defecation should progress rapidly. In fact the defecation with lime and purification by heat should be combined, the juice running directly from the mill into the defecator.

CONCENTRATION.

There are three methods of concentrating or evaporating the sugar cane juice; *first*, by the direct application of fire only (as in kettles, common pans, and the Cook evaporator;) *second*, by the use of both fire and steam, (as in trains composed of fire evaporating pans, and steam defecating and finishing pans;) *third*, by the employment of steam alone (as in the ordinary steam trains, or the steam trains with vacuum pan). Whilst the steam train is complete in itself, a vacuum pan is often used, especially on the larger plantations, as an adjunct to it.

The common method of evaporating cane juice has been by use of a series of open kettles, commonly five in number, hung or placed in a row in an arch over a fire, and called a *kettle train*. The arrangement is to place the largest, called the "*grande*," or defecator, at the foot of the arch, and then have the others diminish gradually in size, towards the front end of the arch to the last and smallest in the row, called the "*batterie*" or finishing kettle.

In the kettle train the defecation is very imperfect. The skum is constantly and irretrievably remingled with the juice, and locked up by the constant ebullition; and the operation, which requires dipping from the *grande* or first kettle to the second, then from the second to the third, and so on to the last, hinders complete crystalization of all the syrup, and darkens the syrup and sugar by the prolonged boiling and imperfect cleansing. Another objection to the kettle train is, that it takes too much fuel in proportion to work done.

To lessen these serious objections, plain flat bottom pans, arranged on the principle of the kettle train, and other arrangements of the plain pans have been employed. But no change of principle and no real improvement of importance was made till the introduction of the Cook process, which marks an epoch in open fire evaporation. Whilst the Cook pan, with its high ledges and compartments, more perfectly applies the principle of the kettle train, it retains none of its defects. It secures better defecation, more rapid concentration, improves the crystalization, affords lighter colored products, and requires less labor and fuel.

Its process is continuous, and the juices in the different stages of defecation and concentration do not mix whilst the impurities are being liberated and secured. The only objections fairly urged against this process—the labor of skimming, and the want of a suitable *batterie* for finishing—have, happily, been overcome within the last two years, by the addition of an arrangement for skimming automatically, and also of a *Strike* pan. With these improvements, the Cook pan embraces all the requisites demanded by the ex-

perience of years for the most perfect sugar-making possible, by open fire evaporation, and furnishes by far the most perfect fire apparatus known.

STEAM EVAPORATION.

The use of steam for evaporating cane juice is preferable to fire, as it allows perfect control of the heat, and is more expeditious. Through pipes the heating surface is immersed in the liquid, and it cannot be injured by burning. It also economizes fuel and effects a great saving of labor.

The most perfect method of sugar-making is found in the connected steam train. This consists of a series of vessels of different sizes, arranged in order, and all supplied within with steam heating pipes, connected by branches with a main pipe from the boiler.

This places the successive operations of defecating, concentrating, and finishing by steam, under the immediate and convenient control of the sugar-maker. The heat is readily increased or diminished or withdrawn from either vessel at pleasure.

As sugar-making by a connected steam train is a continuous as well as rapid process, it is important that proper arrangement and proportions of all the parts be provided, including also the even and reliable working of the mill, so that the continuity of the operations may be harmoniously and effectively preserved to the end.

Whilst beyond question, steam is the best agent used in boiling cane juice, and the connected steam train the most perfect and simple apparatus, the effectiveness of the latter may be *seriously impaired or totally destroyed* by ignorant management, or *improper proportions of vessels and pipes*. In these, experience and skill are absolutely necessary.

If the planter has an Engine and Boiler of sufficient capacity to run his mill and plenty of steam to spare, he can use steam profitably, for working up even a small crop, either with steam pans entire; or with steam pans for defecting and finishing, and a fire evaporator for concentrating.

In the practical operation of the latter plan, the juice is defecated by steam, then passes into the Automatic Cook Evaporator, where it is concentrated nearly to the sugar point, and then on to the *batterie* where it is finished by steam.

SUGAR MAKING.

After a thorough defecation of the juice, and its rapid concentration to the sugar point, the next object is to secure crystalization. The liquid should be put into shallow coolers, and kept at a moderate warmth and even temperature. Nature will do the rest.

After the sugar has crystalized in the coolers, all that remains to do is to separate it from the molasses. This may be done by draining. The best means is by the use of a centrifugal. This rapidly expels the molasses from the sugar by force, leaving the sugar dry and finished.

It is important that the mill, tanks, and all vessels and utensils connected with sugar making be kept clean and sweet; and for that purpose a good supply of clean water should always be kept on hand.

Remember that "a little leaven leaveneth the whole lump," and that cane juice is very susceptible to change, the first or incipient step of which is a conversion of crystalizable to uncrystalizable sugar. This may occur extensively before any appearance of fermentation can be detected.

It may be well to add that to realize the largest profits commercially from the products of the sugar-maker, it is not only desirable to make the *best*, but it is of special importance that the syrups be of *even grade*. It is not necessary to employ so-called *secret* processes. There are no *mysteries* in this industry not common to all intelligent operators.

The makers of the necessary apparatus should be practically experienced in all the details of sugar-making and able to give all needful directions.

When practical experience is desired to manage or assist in taking off the crop, the services of competent persons may be had.

We cannot impress too strongly the *danger of loss*, where parties without knowledge of the business and without experience, from *false notions of economy* attempt to plan the size, proportions, etc. of, and to construct, the apparatus. *Failure, broken fortunes, and ruin almost invariably follow.*

SUGAR MACHINERY.

Too little attention is paid to the character of sugar cane juice, the process of manufacturing into syrup and sugar, and the apparatus required to produce the best results.

We have manufactured sugar machinery as a *specialty*, for both the Northern and Southern canes, for about a *quarter of a century*. During this period, we have had in continuous employ some of the most skillful and experienced artizans of our predecessors, the Niles Co., the old Superintendent of which, beginning his remarkably successful engineering on sugar machinery in 1836, closed his career in our employ in 1880.

For many years we published a monthly magazine, the *Sorgo Journal*, the only periodical that has appeared, devoted entirely to the interests of the Northern Canes. Its publication was kept up at a large expense until the cane interest in the North was placed on a sure foundation.

Our sugar machinery is universally recognized as the only *standard* and the best. This distinction has been fairly earned by its high character. Our experience with sugar-making and the apparatus, covers a wide range in this and foreign countries. We have customarily spent a portion of the working seasons on the plantations and among the mills, and are consequently familiar with the practical working of the machinery in general use, as well as the best methods of using it.

Our observation confirms, what every intelligent sugar engineer knows, that, without large experience, no one is competent to advise as to the method and apparatus for sugar-making, much less to *construct* the machinery.

Generally the manufacturers of cane machinery in this country design it for light work. Their trade is local, and they aim to sell as low as possible. They have no acquaintance with sugar-making, and no practical knowledge of the kind of machinery needed, or how to work it.

It requires *several seasons*, under the usual varying conditions of cane, to *test new apparatus*, especially the mill, before it can be known to be reliable. All the machinery we make has been thoroughly tested in practical use (some of it for over a quarter of a century,) by ourselves, and planters, and it stands to-day unrivalled and absolutely reliable.

CANE MILLS.

The sole object of the cane mill is to extract the juice from the cane, and that mill is best and cheapest which presses out the last possible drop of juice, with the least friction, and with strength for all emergencies. Two-roll mills, rolls in wood frames, *mills with rolls arranged with levers or rubber cushions*, are wasteful, and no planter can afford loss of juice by their use.

Good work, requires at least, three rolls in the mill. Even five rolls are now demanded by some of the most intelligent planters in Louisiana. A large 5-roll Niles Mill (the rolls being $5\frac{1}{2}$ feet long, and weight nearly 100 tons), which we built last year, pressed out 8 to 10 per cent. more juice than had previously resulted from the use of one of the best 3-roll mills run by the same parties. We are now constructing for a prominent planter in Louisiana, a 5-roll mill that will weigh over 110 tons.

To crush cane properly and reliably, requires *great power*. A good mill must be very strong, and when properly constructed it will be *strong and safe, just in proportion to its weight*. Mills made so light that, *in order to hide their weakness*, the rolls are arranged to yield under pressure, cheat their owners.

Mills with such devices are *simply too weak to stand heavy pressure*, and however great the loss of juice to the planter, *must yield under it or break*. The planter can afford neither result. With the best flexible mill that is made the loss of juice will not be less than 10 per cent. *Any one can figure how long it will take such a mill to waste more than its price*. In most cases the loss of juice will range as high as 20 to 30 per cent.

But such mills are not secure even against breakage. The flexible rolls do not provide against it with any certainty. On the contrary, there are abundant proofs, (which can be readily furnished,) that in such mills breakages are quite numerous, and, considering the few sold, very common as compared with rightly constructed rigid mills.

In a good mill the rolls stay where they are set, whether the feeding is regular or not. If the mill is not evenly fed, it is all the more important that

the rolls should do their duty, so that no cane can pass through until all the juice is gotten out of it. When necessary to crowd the work, as often happens, the mill must be strong enough to stand it.

In ignorance of the function and chief value of a mill, occasionally it is claimed that the *rolls run faster* and the mill runs *lighter* than others. Experienced manufacturers know that there is a certain proper speed rolls should travel, and that they *can only run light in proportion to lack of pressure, and consequent loss of juice they allow*. Pressure means power, and can only be produced by the exertion of power. Certainly, a mill that *presses out only the free juice*, and lets a *large part of the crop go with the bagasse*, will run light, lighter than one doing honest work.

It requires the *highest degree of mechanical skill, large experience, familiarity with its practical working, and long-continued tests extending over years, to perfect a cane mill*. One of the greatest discouragements to the cane industry has been the introduction, occasionally, by misrepresentations, at seemingly low prices, of mills utterly unreliable and wasteful.

In selecting a cane mill, great care should be exercised. Buy only from manufacturers of known reputation in the building and practical working of the mill, and who possess the skill, experience, and facilities for building the mills they offer to sell.

It is also important to compare carefully the *numbers, size of rolls, style and weights* of the various mills. The numbers of one manufacturer are no measure of the sizes or weights of another. Where properly constructed, a mill weighing a ton is worth more than one of half a ton. A close comparison of the *weights, sizes and prices* of mills will often guard the purchaser against imposition, and will disclose the fact that our best small mills are heavier by 25 to 50 per cent., and the steam mills by 50 to 100 per cent. than others; and when this, together with their character is considered, it will appear *they are not only the best but as low in price as any*.

MILLS FOR HORSE POWER.

We make two leading styles of vertical horse power mills, and one style of horizontal. The *vertical* is preferable, as the friction of an extra gear, and a beveled one at that, is avoided.

The *Victor* Mill is undoubtedly the best horse power mill ever produced. It not only avoids the extra strain of the bevel gear, but dispenses with that bane of the cane mill, the return plate, (*choking plate*, it should be named) between the rolls. The Victor alone carries the right (by patent) to the peculiar arrangement of rolls that gets rid of the *choker*. It has long been the admitted standard vertical mill. It was introduced in 1863. Not less than 22,000 are in use in this country, and it is the leading vertical mill in the principal sugar-growing countries of the world.

The *Victor* is very complete and of great strength. It is heavier than other mills of its size, as will be seen by a careful comparison of *weights* and sizes of rolls.

The *Great Western*, (second only to the *Victor* in character, durability and reputation as a first-class mill, and superior to any others,) has been favorably known for many years. Whilst not as heavy as the *Victor*, it is well proportioned and made, and is sold at a less price.

It is proper to observe that the popularity of the *Great Western* has induced certain inexperienced and incompetent parties to imitate its style, and print illustrations of it with such slight variations in name as they hope may enable them to deceive purchasers as to the mill they are getting. The "*Great Western*" is *patented*, and *manufactured only by ourselves*.

HORIZONTAL HORSE POWER MILLS.

The *extra gearing* required in horizontal mills for horse power increases the weight and cost. On account of the extra gearing, horizontal mills require more power than vertical mills, to do the same work. If light in weight, they are worthless.

Horizontal mills, if strong enough to do any work corresponding with their cost, must be heavier than the vertical on account of the weight of the extra gear. We make them for those who prefer this style, but we are unwilling to impose the light trash upon our customers, knowing that such cannot stand good work.

We make two sizes of these mills, and they are entirely reliable. We call especial attention to the weights, in connection with the prices of these mills.

STEAM CANE MILLS.—THE NILES MILL.

No mills equal the Niles in construction, strength and finish. Of the character, work, and reputation of these mills it seems superfluous to say a word. The name suggests to planters more than we could say. Since 1836, a period of nearly 45 years, they have been the leading mills of the country.

Probably *three-fourths of all the plantations of Louisiana have been supplied with Niles sugar outfits*. On many plantations the mills that are now the dependence for taking off the crops were at work before the present occupants of the plantations were born.

In the original construction of these mills, the highest scientific knowledge and greatest mechanical skill and experience attainable were called into requisition. These secured a correct proportion in all parts of the mill, so that every ounce of metal, whether in gear, or frame, or roll, or shaft, was made to do its appropriate work, and was subjected only to its appropriate strain.

The *Niles Mills* were first introduced in 1836, and have ever since been the standard cane mill in Louisiana. After they had been in operation eighteen years, under the closest observation, they were overhauled and a

new and improved set of patterns built. *These patterns have now been in use twenty-six years*, and are by far the most perfect and thoroughly tested and reliable of any in the country.

This work was completed under the direction of one of the most intelligent and skillful mechanical engineers of the time, who constructed the first mill for our predecessors in 1836, and in 1880 closed his successful career in our employ.

Of the Niles steam mills over 500 *have been sold* in Louisiana alone, and many of them have been in use thirty to forty years. In one year were sold 56 *Niles Mills, varying in size from 4-foot rolls to 6-foot rolls*, the total weight of which mills was 2,700,000 lbs., or 1,335 tons. In Louisiana, where the Niles Mill has been for forty years in competition with mills from the best foundries in the world, it has proven vastly superior to all of its rivals.

HORIZONTAL VICTOR—For Steam or Water Power.

The Horizontal Victor, has the same plan of dispensing with the return plate between the rolls, which has given such a celebrity to the Vertical Victor. These mills are made extra heavy and strong, and of as good workmanship as our Niles Mills.

They are especially adopted to the wants of the smaller planters who use steam or water power.

They have been in use many years and large numbers have been sold, and have always given excellent satisfaction.

In comparing the Victor and Niles mills with others, it is necessary to know: the size of rolls; the *weights* of the mills; whether they have *iron bed plates* or wood frames; whether *single gear or double geared*; whether with feed aprons only, or *feed carriers and bagasse carrier* (and how many feet). Examine carefully the description of mill as indicated above, and notice what is included in the price.

Relative prices cannot be known without observing closely all these particulars, to say nothing of the character of the mills.

For full descriptions of our cane mills we refer to the illustrated pages commencing with page 16 of this Hand Book.

EVAPORATING APPARATUS.

For many years the Cook Evaporator has been the most popular and successful for fire service. Indeed, the existence to-day of the Northern cane industry is mainly due to this remarkable invention. Its use and popularity have become well-nigh universal.

But notwithstanding its superior advantages, there have been points which our long experience with it demonstrated could be improved; and from time to time, within our own operations, these points have been improved, and practically and thoroughly tested, and then patented.

These improvements necessarily increase the cost and price of the Evaporator, and hence their introduction has been reserved for the time we saw coming, when planters would demand and pay for more perfect apparatus.

That time has come, and we now take pleasure in introducing to the public, *after several years trial in our own hands, and after two years thorough and satisfactory trial in the hands of planters, our*

AUTOMATIC COOK EVAPORATOR.

This Evaporator preserves the good qualities of its famous forerunner, but *saves most of the labor of skimming, makes more syrup with the same fuel, increases the yield of syrup from a given quantity by securing a re-separation, and improves the quality.* It is unquestionably the most perfect pan ever devised.

It accomplishes all that is possible in a single fire Evaporator.

Its operations can be profitably enlarged, and a more even grade of syrup produced, by supplementing it with a *finishing* or "*strike*" pan, in which is fixed a syrup thermometer. This improvement we have used with marked success. While the strike pan is connected with the Automatic, its bottom is on a lower level, and protected by a double flue and dampers, thus enabling the operator to finish the syrup in a *deeper body*, where the *heat is under easy control*, and insure an even grade of syrup, without endangering the crystalization.

This arrangement, which is pronounced the most perfect possible for open fire evaporation, we especially advise for all the larger operators not provided with steam. *It combines conveniently and successfully provisions for the three distinct processes of defecation, separation and concentration, and finishing.*

STEAM AND FIRE TRAIN.

This is an arrangement of a *defecator* and *finisher*, in connection with the *Automatic Cook Evaporator*, by which *steam* is used in the *defecator* and *finisher*, and *fire* under the *evaporator*. The object of this arrangement is to lessen the first cost of the apparatus, and yet provide steam for defecation and finishing. A large proportion of the outfits we supplied last season to the North-west were of this kind, and gave general satisfaction.

CONNECTED STEAM TRAINS.

The connected *steam sugar train* is the best apparatus when it is desired to work with steam alone. The sole objection to it is in the first cost, but for convenience, durability, ease of management and character of products it has no superior. We have had large experience in furnishing such trains for the South, but they have generally been large and costly.

We are prepared to furnish smaller steam trains, made as simple and inexpensive as possible, and at prices that we believe will be found to be within the means of all who desire to do their work entirely with steam.

VACUUM PAN

There are two forms of the Vacuum Pan in use. In one the vacuum is formed by a jet-condenser, and in the other the vapor is drawn off by a separate Vacuum Pump. The former is called a *wet* vacuum and the latter a *dry* vacuum.

The Vacuum Pan is generally made of cast iron, and in general outline somewhat resembles a still.

It has a *circular body*, with *bottom of pan shape* (to which is attached lugs to support the pan), and a *dome top*. From the dome extends the *vapor pipe*, the *overflow*, and the *condenser* (which in the wet vacuum is placed close to the Pan and connected to the Vacuum Pump.)

The heating is done by steam introduced through copper coils, the number and diameter being governed by the size of the Pan. *Eye glasses* are provided in the dome and side of the Pan, through which the action of the boiling syrup is observed. The Pan is also provided with *vacuum gauge* and *thermometer*, *test cup* and *proof stick*, by which to examine the work as it progresses. When finished the contents of the pan are discharged through a large valve in the bottom of the Pan. Vacuum Pans range in price from about \$1,000 to as high as \$10,000.

The capacity of the Vacuum Pan is estimated by its diameter and height. The diameter varies from four feet in the smallest size to eight feet and over in the largest sizes.

To planters wanting *vacuum pans*, *centrifugals*, and other sugar apparatus, estimates will be furnished on application.

CONCLUSION.

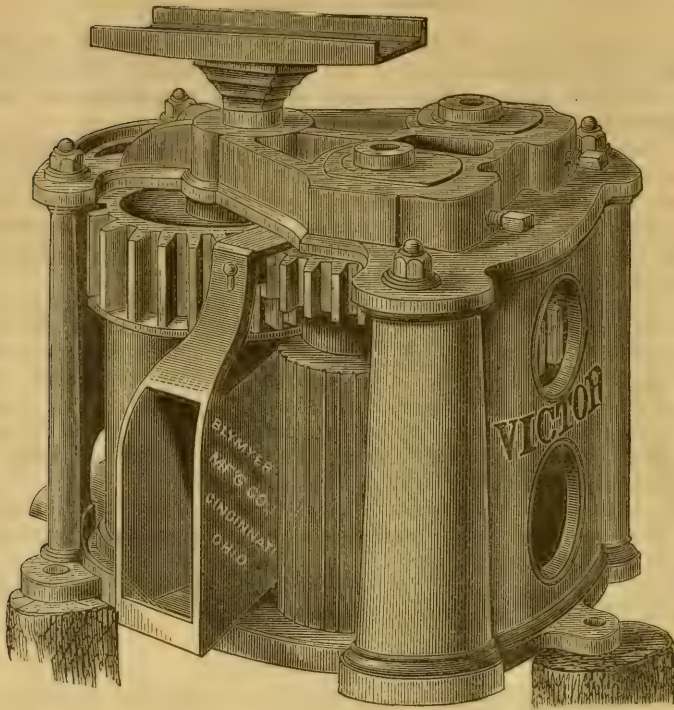
It is *all-important* that all the parts of machinery and apparatus needed for steam sugar works be *adapted to each other*, so as to secure harmonious action. As we manufacture all the machinery and apparatus that are needed for sugar works of any capacity desired (including Cane Mills, Steam Engines and Boilers, Steam Train Evaporators, Vacuum Pans, etc.) we can guarantee *exact sizes and proportions, correct connections; and harmonious working*.

Next in importance to suitable machinery is to *get it in time*. Many, sensible enough to decline to risk a crop on a light mill and untried apparatus, will put off ordering their outfit till, by reason of *orders ahead*, or other delays, it arrives too late entirely, or so far behind that nothing goes well. *All cane machinery should be ordered early*. It is especially necessary that the larger steam machinery be arranged for early. It takes considerable time to make it, as well as to arrange it after reaching the plantation.

Parties wanting large mills, or steam trains, will find it to their advantage to *call at our works and examine the machinery constantly in course of construction*, and make their final arrangements after full conference with us. We add that we sell no machinery from our works that is *experimental*. *It is all made by us*, and fully warranted in every respect.

In the sale of our outfits is included: *Directions for Apparatus, Directions for making Syrup and Sugar, (including Defecation, Sulphur Fumigation, Drainage of Sugar, etc.,)* and *Directions for Construction of Furnace for Bagasse, without extra charge*, to those who wish them.

THE VICTOR CANE MILL.



THE VICTOR.

The above engraving illustrates the **Victor Cane Mill**, the leading Mill for Animal Power in all States where either the Sorgo or Sugar Canes are grown. It has been awarded the **First Premium** over all competitors at **Fifty-one State Fairs**, and was awarded the **Grand Medal at the Centennial Exhibition**. It has met every mill of any character in all the country at every Working Trial, and has taken the Premium over all. The number sold since 1863 exceeds **Twenty-two Thousand**.

These facts alone speak more than volumes as to the merits of the mill. A machine that beats all others on trials, and that has received the approbation of **Twenty-two Thousand purchases**, can not be otherwise than the best machine.

The following are the peculiar features which give the Victor its great superiority :

1. It has Great Strength. This is secured by the *amount* of metal, the Victor being from 15 to 40 per cent. heavier than other mills of the same horse-power; by its *quality*; and by the *exact adjustment of all its parts*. ALL CHEAP MILLS ARE NECESSARILY SHORT-LIVED.

The Victor is made of the best and strongest iron, *with wrought shafts*, and *lined boxes*. The *shafts and rolls are all turned off true*.

2. It Presses the Cane Dry. Only a strong mill can do this. Wooden mills, or iron ones with *Cast Shafts*, or shafts resting on *Rubber Cushions*, break or yield when the pressure is heavy.

3. It can not Choke. The clogging and choking, so troublesome to other mills, is caused by the "Dumb return," or "Knife," or "Guide," as it is variously called, between the rolls. The presence of this is a *necessity in all other mills*, and hence they choke; but, by means of the Lapped Gearing, this Knife is dispensed with in the Victor, and, consequently, as there is nothing between the rolls to obstruct the cane, it passes through as easily as it enters.

4. It Works Easy. Being freed from all clogging between the rolls, and the rolls themselves being lifted from the bottom plate so as to touch only at the ends of the shafts, it is freed from most of the friction common to other mills.

5. Oiling and Wear. There is a protection against wear in the perfect oiling of the journals. Every journal and oil-box is accessible, and can be readily taken out by hand. *Some mills, to avoid our Patents, by which we control removable oil-tight boxes for the lower journals use no oil at all, but allow the juice to run into the lower boxes. This arrangement is not only dirty and filthy, but permits, of necessity, the speedy cutting of the journals.* AS WELL USE WATER FOR LUBRICATING A WAGON OR AN ENGINE!

Oiling lower journals by depending on *horizontal* flow of oil has failed. Directly downward is the only way oil will flow in chilly weather, as our success, and the failures of those using horizontal flow have demonstrated.

6. It Feeds Easy. It is the only mill with a *GOOD Feed Box* for regulating the entrance of the cane. Without such regulator, feeding is both difficult and dangerous.

7. It does Clean Work. Flanges keep the cane from working over or under the rolls; wipers clean the faces of the rolls; and the channel in the bottom plate receives the juice as it comes from the rolls.

8. Its Work is Even and Regular. It has *Screws* for regulating the position of the rolls. These don't get loose as *Keys* do, but hold the rolls to their exact position, no matter how hard the pressure may be.

9. It Loses no Time nor Power. The Size and Capacity of the Victor Mill are arranged with special reference to a corresponding size and capacity of the Evaporators, so that the "supply and demand" may be always equal. The two thus work together as but different parts of the same machine.

Our Mill Patents include *the Fluted Feed Roll, Three Rolls arranged so as to dispense with the "return plate," Diagonal Braces, Oil Tight Boxes, Movable Sweep Cap, Cleaning Scrapers, Juice Channel in Bottom Plate, Hand Hole in Top Plate, Juice Plate, Fastening the Gearing to Vertical Rolls with Clutches.*

Beware of purchasing mills with any of the above points, unless the manufacturers are licensed by us.

Size, Capacity, and Weight.

No. 0, Small,	1 horse,	Capacity 40 galls. per hour,	Weight, 390 lbs.
No. 1, Junior,	1 "	" 50 "	" 550 lbs.
No. 1, Large,	1 "	" 60 "	" 750 lbs.
No. 2, Regular,	2 "	" 80 "	" 875 lbs.
No. 3, Heavy,	2 "	" 100 "	" 1200 lbs.
No. 4, Large,	2 "	" 120 "	" 1300 lbs.
No. 6, Large,	4 "	" 170 "	" 1800 lbs.

The No. 6 Mill is substituted for No. 5. The Main Roll is 20 inches in diameter, and the Gear is separate from the Rolls.

These numbers relate only to the Victor. The numbers of one manufacturer are no measure of the weights and sizes of another.

THE COOK EVAPORATOR.



PORTABLE EVAPORATOR—FURNACE AND PAN.

For the smaller pans, Nos. 2, 3, and 4, portable furnaces are provided. These are made of cast iron and sheet iron, heavily bound and riveted, strongly made, and the whole mounted upon rockers of angle iron—thus furnishing a complete portable furnace of iron and brick, combined in one, with all the advantages of both, and yet so light that it can be easily handled by two men. This is the most convenient arrangement for small home operations, and for custom work it is well-nigh indispensable. With it the operator can move from field to field, or from farm to farm, and thus avoid the labor and expense of hauling the cane.

SIZES OF PORTABLE EVAPORATORS.

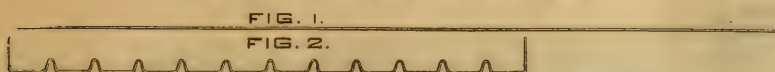
No. 2, with Galvan. Iron Pan,	44 by 72 inch,	syrup per day,	40 to 50 gals.
No. 3, “ “ “	44 by 90 inch,	“ “	55 to 75 gals.
No. 4, “ “ “	44 by 108 inch,	“ “	60 to 90 gals.
No. 2, with Copper Pan,	Light Copper,	Heavy Copper.	
No. 3, “ “	Light Copper,	Heavy Copper.	
No. 4, “ “	Light Copper,	Heavy Copper.	

Material. The Evaporating Pan is made of Sheet Metal—Galvanized Iron or Copper—of thickness proportionate to the length of the pan. This sheet metal is made expressly for our own use, and is of the best quality, and of uniform thickness. Inferior grades of metal, such as are used with ordinary evaporators, can not be used in the Cook, on account of the heavy strain to which it is subjected in crimping the ledges or partitions. This is done by pressing the solid sheet with heavy machinery, especially constructed for the purpose. Only the toughest of metals will stand the strain, and so only the best of Juniata galvanized iron, and the purest copper are used. Hence our Pans last longer by some years than others, and neither buckel, bag, nor warp, nor incur expense for repairs.

Construction. At intervals of about six inches, ledges or partitions are made to project upward across the bottom of the pan, the alternate ends being open, so as to form a continuous channel from one end of the pan to the other. The sides of the pan extend beyond the fire line of the furnace so as to give a cooling surface for the collection of the scum.

The ledges, or partitions, are open at the bottom, being crimped or pressed, as explained above, out of the solid metal. This gives about $\frac{1}{2}$ more heating surface than other pans of the same length, and requires about $\frac{1}{2}$ more metal.

HEATING SURFACE OF COOK PAN.



The above cut represents the proportionate length of the sheet used in making the No. 2 Pan, and the length of the pan itself. The sheet is 9 feet in length, and the pan 6 feet in length.

A Cook Pan has therefore $\frac{1}{2}$ more heating surface and capacity than other pans of equal length. But its proportionate capacity is still further increased by the Process of Evaporation—the use of a shallow flowing body of juice.

We could make the Cook Pan at less cost by riveting or soldering the ledges to the pan, instead of crimping them in the solid sheet as we now do. We could then use the inferior grades of metal, and it would take a smaller sheet to make the same size pan.

But in doing this, not only would the capacity of the pan be greatly lessened, but the pan itself would be inferior in every way. It would not do nearly as much work and would not last half so long. It would be liable to give continual trouble by leakage, resulting in the discoloring and burning of the syrup.

Operation. The juice is received into the front end of the pan in a constant stream. The first ledge preventing a forward movement, it flows across the pan,—turns round the open end of the ledge,—back to the side upon which it entered,—then round the second ledge,—thence back again to the opposite side,—and so on until it reaches the outlet at the finishing end of the pan, whence it flows off in a constant stream at any density desired.

Skimming. The constant influx of the cold, raw juice keeps the liquid in the front end of the pan at a comparatively lower temperature while it is passing around the first few ledges, and thus gives time for the heat to throw up the more crude impurities, and the operator to remove them. And, as a matter of fact, most of the skimming is confined to a small space at this end of the pan. As the current passes on over the more intensely heated portions of the pan, new impurities are evolved and borne by the current to the cooling sides, where they remain in the form of scum, to be removed at the pleasure of the operator.

Results. There being but a small amount of juice in the pan, and that being spread over a broad extent of evaporating surface, every portion is subject to the direct and intense action of the heat, and consequently the *Evaporation is more rapid*, and the *Defecation and clarification more thorough*, than is possible in any arrangement where the liquid is boiled in deep, narrow masses, and for a long time exposed to the heat. As the result, there is a *better quality of syrup and of lighter color*.

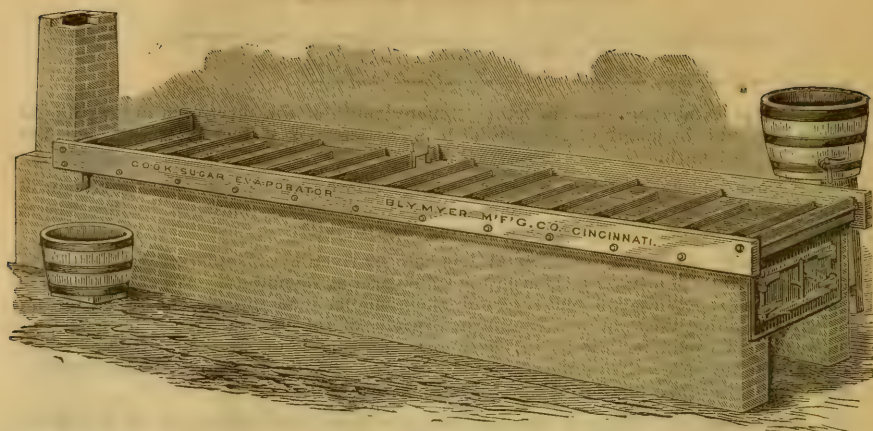
Economy. While the Cook Evaporator in its purchase price costs more than common Evaporators, and by comparison seems high, still, in the end, it is the *cheapest pan* in the market. *It saves labor, fuel, and makes more and better syrup and sugar.*

The Cook Evaporator has taken the **First Premium** at every National Fair, and at **seventy State Fairs**, and the Grand Medal at the **Centennial Exhibition**. In this country alone over **Twenty-eight Thousand** are in use. It is in use in Mexico, South and Central America, and all countries where sugar cane is grown.

The Cook Patents. These cover the *Process of Evaporation* by boiling a moving body of juice, and any pan arranged in channels to make this practicable; also any *channeled pan in which a cooling surface is used* as a resting place for the scum; and any *pan arranged* (with rockers or otherwise) *so as to regulate the flow of juice over the bottom*.

PORTABLE OUTFIT.

In working the Victor Mill and Cook's Evaporator, the Evaporator should be one or two numbers higher than the Mill. The Cook and Victor are the only Mill and Evaporator that are adapted to each other in capacity. This is a matter of much moment to the operator. The Victor Mill can be bolted to a frame placed upon any common farm wagon, and be worked there all the season. When done at one place the operator has only to transfer the team from the sweep of the mill to the tongue of the wagon—load the Evaporator upon it—move off to another—change the horses back to the sweep—go to grinding—and by the time he has juice enough for a start, the Evaporator is ready for operation again.



COOK PAN FOR BRICK ARCH.—Nos. 3, 4 and 5.

For Stationary work on brick or stone arches, the pans are made with high ledges, or divisions with Gates, as represented in the cuts herewith presented, and the flow is regulated by the gates. Nos. 1 and 2 have no high ledge or gate.

The *above* cut represents the Cook Pan for Brick Arch, Nos. 3, 4, and 5. They have one high ledge with gate. The Cook Pans for Brick Arch Nos. 6, 7 and 7½ have two high ledges with gates. All sizes made either of galvanized iron or copper.

Size and Capacity of Cook Pan for Brick Arch.

No. 2, . . . . .	.44 by 72 inch, . . . . .	.40 to 50 galls. per day.
No. 3, . . . . .	.44 by 90 inch, . . . . .	.55 to 75 galls. per day.
No. 4, . . . . .	.44 by 108 inch, . . . . .	.60 to 90 galls. per day.
No. 5, . . . . .	.44 by 126 inch, . . . . .	.90 to 130 galls. per day.
No. 6, . . . . .	.44 by 144 inch,	120 to 160 galls. per day.
No. 7, . . . . .	.44 by 180 inch,	130 to 180 galls. per day.
No. 7½, . . . . .	.54 by 180 inch,	150 to 200 galls. per day.

AUTOMATIC COOK EVAPORATOR.

PATENTED SEPT. 26, 1876, SEPT. 23, 1879,—1880.

(See Illustration on next page.)

The *Automatic Cook Pan* has three divisions, each performing separate offices, and all connected by high ledges and gates under the full control of the operator. The processes of defecation, clarification, and finishing are systematically carried on without interruption to the end.

The *first division* frees the juice from its crude impurities, whilst passing through the channels, by the automatic action of the skimming device, which throws the scum in an opposite direction from the moving juice.

In the *second division* the juice is freed from its remaining impurities and reduced to semi-syrup. This division is provided with high ledges, to prevent the mixing of the juice, and is so constructed that the scum is thrown to the opposite side, or into the trough, to be returned to the first division for *re-separation*. *This saves a considerable percentage of syrup.*

The semi-syrup is taken by the *third division* and finished as rapidly as possible to the sugar point, and drawn into coolers.

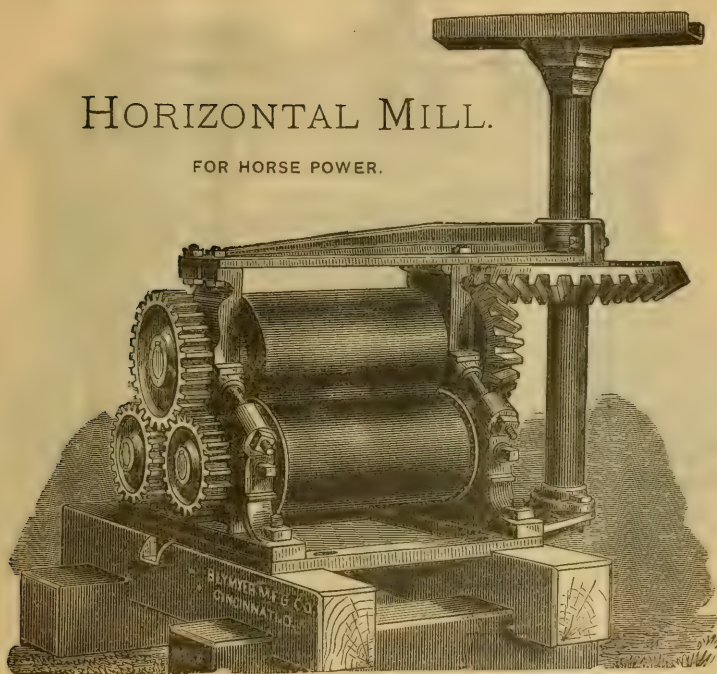
The Automatic Cook Pan *secures thorough defecation, saves a large percentage of juice* that would otherwise be wasted, and saves labor *in skimming and fuel.*



AUTOMATIC COOK EVAPORATOR.

HORIZONTAL MILL.

FOR HORSE POWER.



Power.	Size of Rollers.	Weight.
No. 1—2 to 4 horse,	1—15x12, 2—15x9,	2,100 lbs.
No. 2—4 to 6 “	1—20x12½, 2—20x9½,	2,400 lbs.

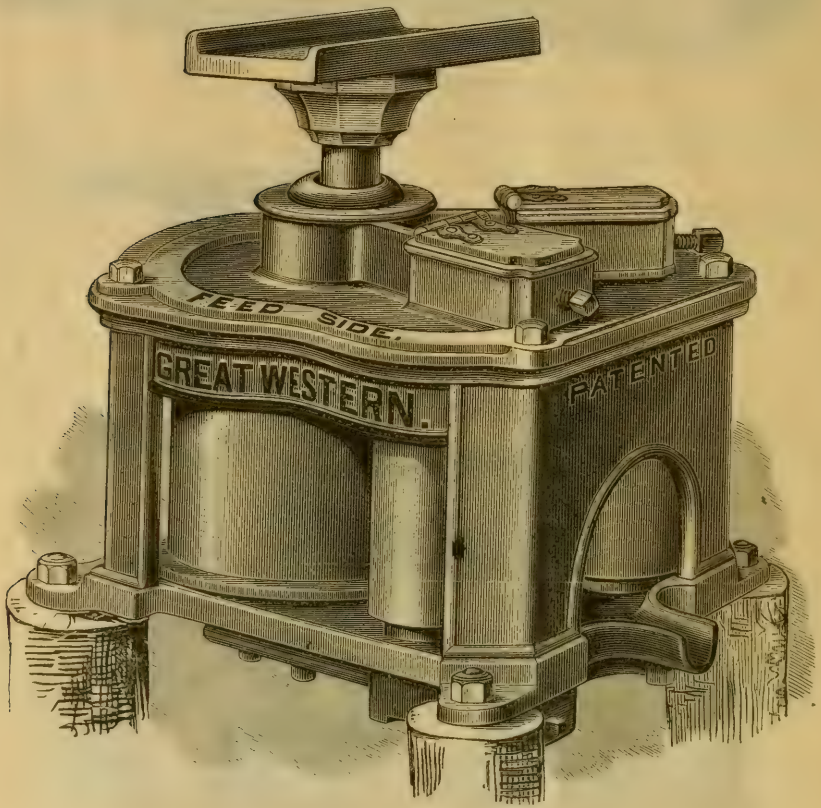
The extra gearing required in horizontal mills for horse power increases the weight and cost. On account of the extra gearing, horizontal mills require more power than vertical mills, to do the same work. If light in weight, they are worthless. The above mills are standard heavy for safety.

It possesses one great advantage over all other horizontal mills, in the position of the sweep, which is thrown above the head of the feeder, and out of his way.

GREAT WESTERN CANE MILL.

Patented.

Turned Rolls, Wrought Iron Shafts, Brass Bearings.



The above Engraving is an accurate Illustration of the Great Western Cane Mill. The great peculiarity of this Mill over others consists in the *cog. gearing being separate and held fast by clutches on each* which clutch into corresponding ones on each roller, making a very simple, strong fastening, thereby doing away with all keys, enabling any one to take the entire Mill apart in a few minutes.

The step boxes are provided with oil chambers which hold nearly half a pint, and are so constructed as to prevent any oil from getting into the juice.

The gear wheels are at the top of the rollers instead of the bottom, bringing them nearer the power, and are entirely closed in by side plates, making it impossible for the operator to get either his hands or cane into the gear.

All Journal boxes are made with brass bearings, which accounts for the easy manner in which this Mill works. Any one who ever worked machinery of any kind knows how much easier a machine runs when supplied with brass bearings, instead of working iron to iron.

SIZE, WEIGHT, PRICE (AT FACTORY).

	POWER.	SIZE OF ROLLERS.	WEIGHT.
No. 0,	Light One-Horse,	One, 5×9 , and two 5×6	375 lbs.
No. 1,	One-Horse,	One, 6×10 , and two 6×7	475 lbs.
No. 2,	Heavy One-Horse,	One, $6\frac{3}{4} \times 12$, and two $6\frac{3}{4} \times 7$	575 lbs.
No. 3,	Two-Horse,	One, $7\frac{1}{2} \times 14$, and two 7×8	825 lbs.
No. 4,	Heavy Two-Horse,	One, $9\frac{1}{2} \times 16$, and two $9\frac{1}{2} \times 8$	935 lbs.

CAPACITY OF MILLS PER HOUR.

No. 0,	Light One-Horse	30 to 40 galls.
No. 1,	One-Horse	40 to 50 galls.
No. 2,	Heavy One-Horse	60 to 70 galls.
No. 3,	Two-Horse	80 to 90 galls.
No. 4,	Heavy Two-Horse	90 to 110 galls.

THE GREAT WESTERN MILL.

For many years the **Great Western** has been one of the two leading mills of the country, standing second to the Victor everywhere, in the salesroom, in its working reputation, and in contests at State Fairs.

It was first made by Messrs. Pearson & Aiken, of Louisville, Ky., as will be remembered by all the old Sorgo growers; afterwards by their successors, Messrs. Aiken & Drummond; and for the last three years by ourselves.

The demands of our trade having made it necessary that we should have a mill that could be sold some cheaper than the Victor, we selected the Great Western as the best mill, and bought Aiken & Drummond's interest in the mill, and have now the sole ownership.

As an evidence of its early popularity it is only necessary to state that in one year only (1865) over eight hundred were sold by a single firm in St. Louis. During all these intervening years it has maintained its reputation, and its standing is such now that certain other manufacturers are *taking the cut of the mill to adorn their circulars and give the impression to the public, though maybe under a different name, that they are really offering the Great Western.* Mills thus offered, however, are but *counterfeits*, hiding their own defects of construction and material under the form of reputable machinery.

ADAPTATION OF MILLS AND EVAPORATORS.

No. 0 Victor Mill.	No. 3 Victor Mill.
No. 1 Pan, or No. 2 Cook Evaporator or Pan.	No. 4 or 5 Cook Evaporator or Pan.
No. 1, or No. 1 Jr. Victor Mill.	No. 4 Victor Mill.
No. 2 or 3 Cook Evaporator or Pan.	No. 5 or 6 Cook Evaporator (Pan).
No. 2 Victor Mill.	No. 6 Victor Mill.
No. 3 or 4 Cook Evaporator or Pan.	No. 7 Cook Evaporator (Pan).

If the Evaporator is worked to its full capacity, one size larger than the mill is enough. If the Evaporator is not worked up to its capacity, the same Mill will supply a larger Evaporator. Ordinarily it is best to get the Cook Evaporator two sizes larger than the Victor Mill.

HINTS ON MILLS AND EVAPORATORS.

Buy None but the Best. They only are safe, and are cheapest in the end. Inferior machinery is not only expensive and wasteful, but often disastrous. *You cannot afford to risk the loss of crops with light, weak, unfinished mills, or with Evaporators that make syrup unfit for the market.*

Buy Mills Strong Enough for all Emergencies. Sufficient strength can not be had without weight and quality of metal, and the best construction and finish. *Mills with cast shafts* or unturned rolls, mills with rolls in wooden frames, *mills with weights to regulate pressure*, thus wasting juice, and two-roll mills, are all *mere make-shifts*.

A Good Mill Must Not Run Too Fast. Some mills are geared to run rolls fast to increase capacity. This carries juice off with bagasse, and throws it from the rolls.

A Good Cane Mill will press out the largest possible percentage of juice. Only a very powerful, rigid mill will do this. **A flexible mill, or one with rolls arranged to yield, wastes the juice.** The loss of juice from the *best* flexible mill over a good rigid mill is not less than **ten per cent.** Any one can figure how long it will take such a mill to waste more than its price. In general the waste is 20 to 30 per cent.

Don't Buy Common Pans or Evaporators. They will cost you more for fuel and labor, and make a poor article of syrup.

Don't Buy Infringing Sugar Machinery. Parties buying or using these are liable to heavy damages. *The makers are generally irresponsible and unable to protect purchasers*, although they promise to do so.

Dont allow Numbers to Confuse you. Manufacturers number differently, the numbers of one are no measure of the sizes and weights of another.

Buy Large Enough. In nine cases out of ten, purchasers buy too small. It costs little more to run a No. 4 Mill and No. 6 Pan than a No. 1 Mill and No. 2 Pan, whilst with the larger you make more than twice as much syrup per day.

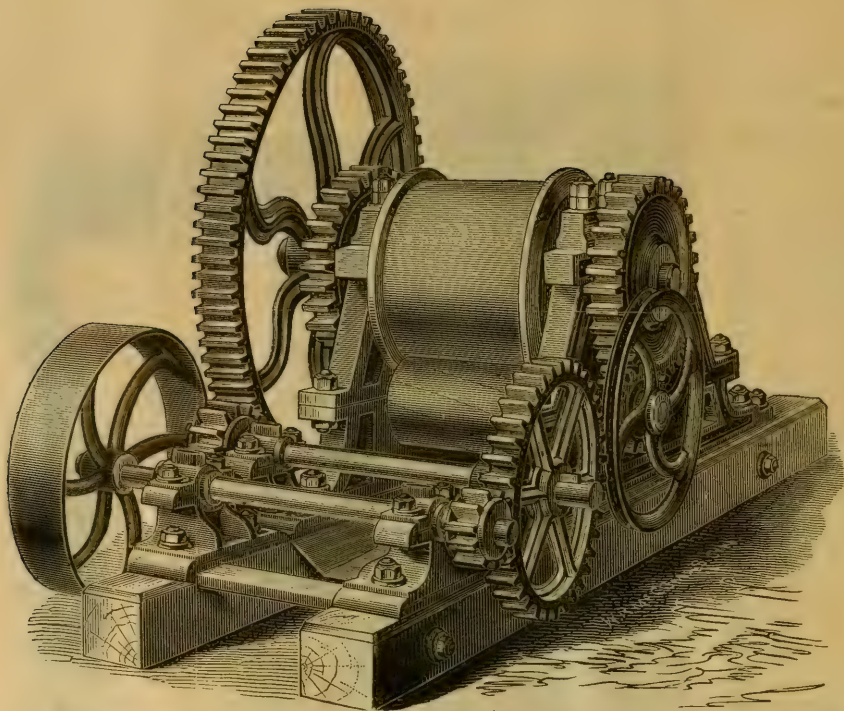
Vertical Mills, (mills with upright rolls) are best for horse-power. On account of the extra gearing required, horizontal mills are heavier, higher-priced, and require more power to do the same work.

Order your Sugar Machinery Early. Too much importance cannot be attached to this. *Many valuable crops of cane have been lost on account of the delay in ordering machinery.* A wide margin should be allowed for delays. The terms of the order may not be satisfactory or well understood, and further correspondence must ensue; or there may be delays on the way, through accident or carelessness of the transportation agents. Sometimes machines, that are properly started, get lost or shipped to the wrong points, and tracers have to be sent, that they may be forwarded to their proper destination. Ordinarily none of the above delays occur (although it often happens that delays will transpire), *but they are liable to occur, and no one can afford to take the risk.*



COOK STATIONARY SUGAR EVAPORATOR—OR, FLOWING SUGAR TRAIN.

The above cut represents our Large Evaporators for Sugar (Ribbon) Cane.



The Horizontal Victor, illustrated in above cut, has the same plan of dispensing with the return plate between the rolls, which has given such a celebrity to the Vertical Victor. These mills have three rolls, and are made extra heavy and strong, and of as good workmanship as our Niles Mills. A Bagasse Carrier, 10 to 15 feet long, is furnished, and is included in the prices given of the mills. If longer Bagasse Carriers are wanted, they will be charged extra, per foot. The Bagasse Carrier is not shown in the engraving, as it would partly shut off the front view of the gearing. If preferred, and so ordered, we will change the pulley to other side of mill.

No. 0, 4 horse,	Weight, 2,300 lbs.	Tons Cane per hour, $\frac{3}{4}$ to 1	ton.
" 1, 6 "	" 3,200 "	" 1 to $1\frac{1}{4}$ "	
" 2, 8 "	" 3,600 "	" $1\frac{1}{4}$ to $1\frac{1}{2}$ "	

The capacity of a cane mill depends not only upon the dimensions of the rolls, the *construction and strength of the mill*, and the *per cent. of juice extracted*, but also upon the number of revolutions the main roll makes in a given time. Some manufacturers, for the purpose of increasing the capacity of their mills, gear them to *run too fast*. This causes *great waste*, inasmuch as such mills *fail to press the cane dry, and throw the juice off the rolls*. The capacity given above for the Victor Mills could be largely increased by gearing them to run faster.

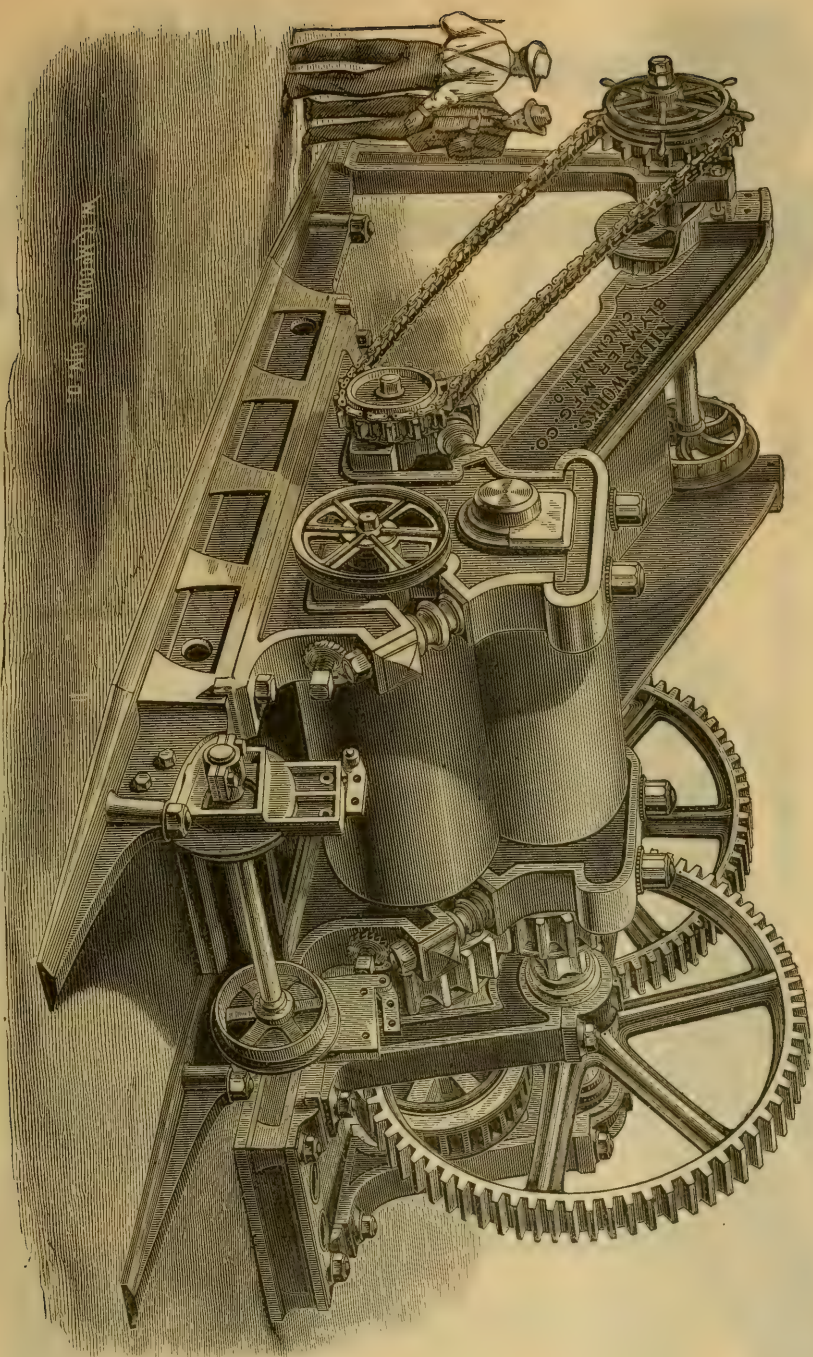
NILES MILLS.

Our large mills are the celebrated **Niles Mills**, of which we are now the sole manufacturers, being the successors of the "Niles Works" in this line, having purchased all their mill patterns, etc. *No mills have ever equaled these in construction, strength, and finish.*

In Louisiana, where the Niles Mill has for *forty-four years been in competition with mills from the best foundries in the world*, it has proven vastly superior to all of its rivals, and now occupies the field almost alone. In that State over **500 HAVE BEEN SOLD**, most of them weighing over 50 tons each.

The Niles Mills range in size from Mills with 3 16-inch rolls to Mills with 5 6-foot rolls, weighing 200 tons.

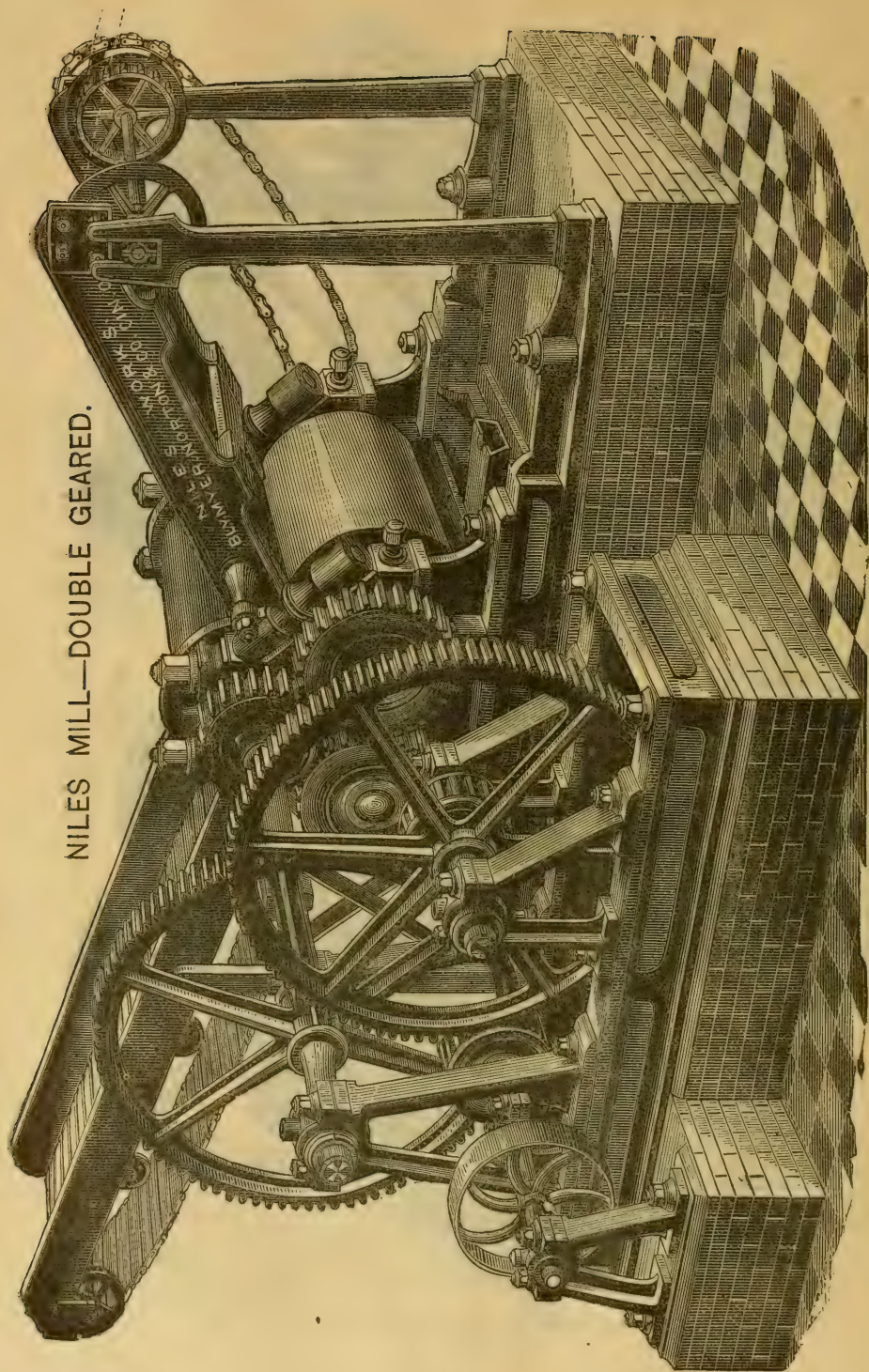
Prices given on application. State Size wanted.



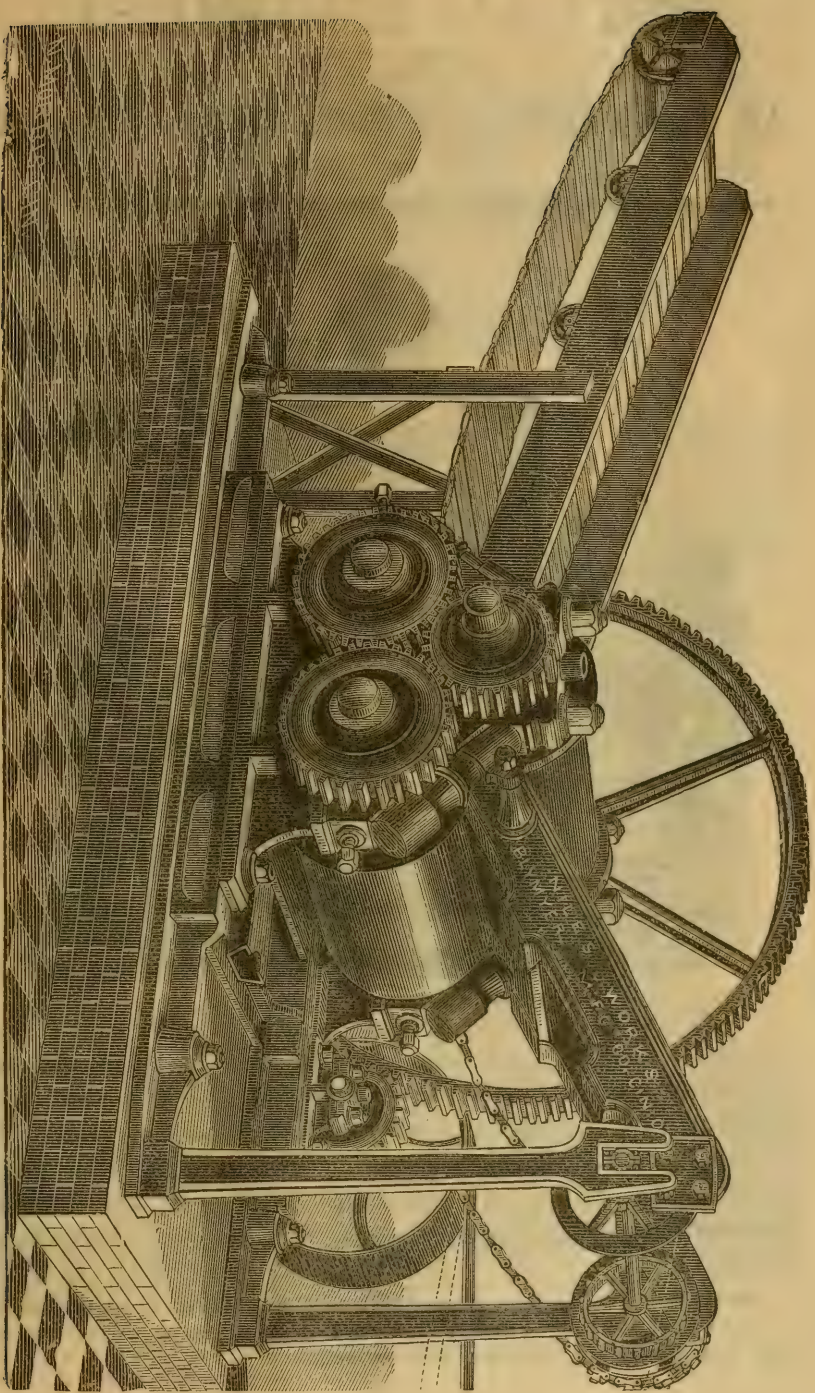
NILES MILL—DOUBLE GEARED.

The above engraving represents the large sizes of the Niles Mills.

NILES MILL—DOUBLE GEARED.



This engraving represents the smaller sizes of the Niles Mill.



NILES CANE MILL—SINGLE GEARED.

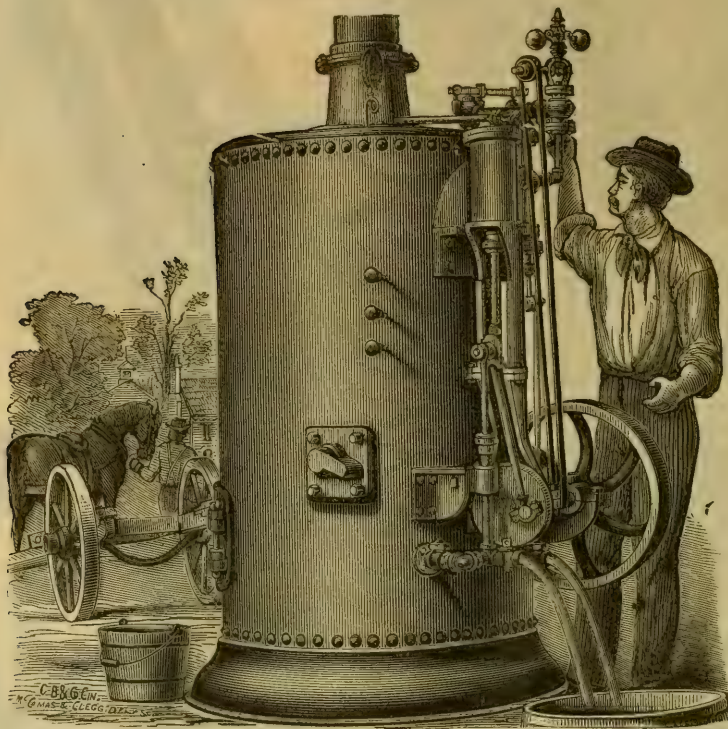
The above engraving represents the smaller sizes of the Niles Single Geared Mills.

STEAM ENGINES.

WE MANUFACTURE

All Sizes Portable, and Stationary Steam Engines
AND BOILERS.

Prices given on application. State Size and Kind of Engine Wanted.

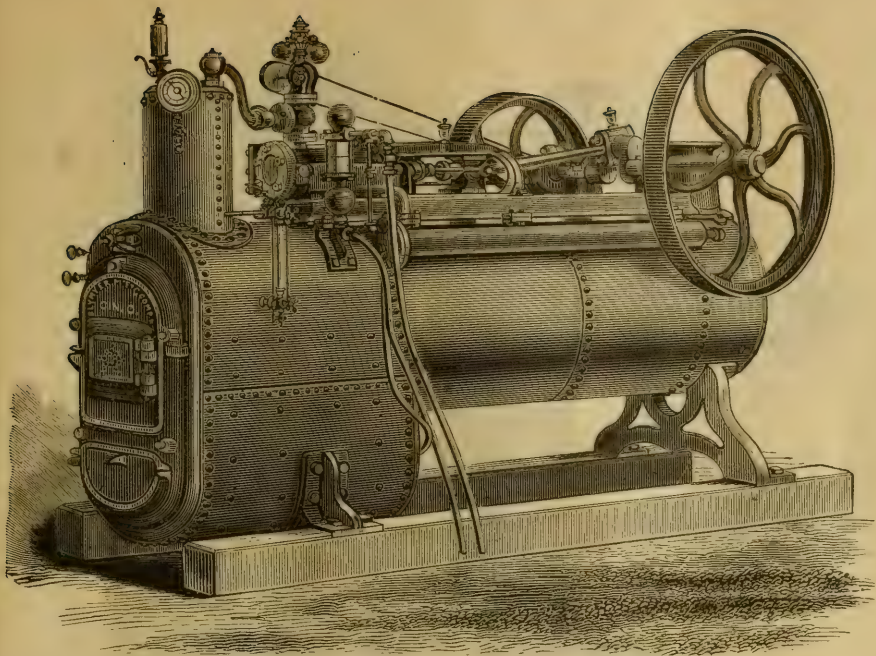


QUEEN CITY PORTABLE.

Our Steam Engine was awarded the Gold Medal, first premium, by the Cincinnati Exposition of 1879, on the unanimous recommendation of a committee of three mechanical experts, who made thorough working tests of the Engines in competition.

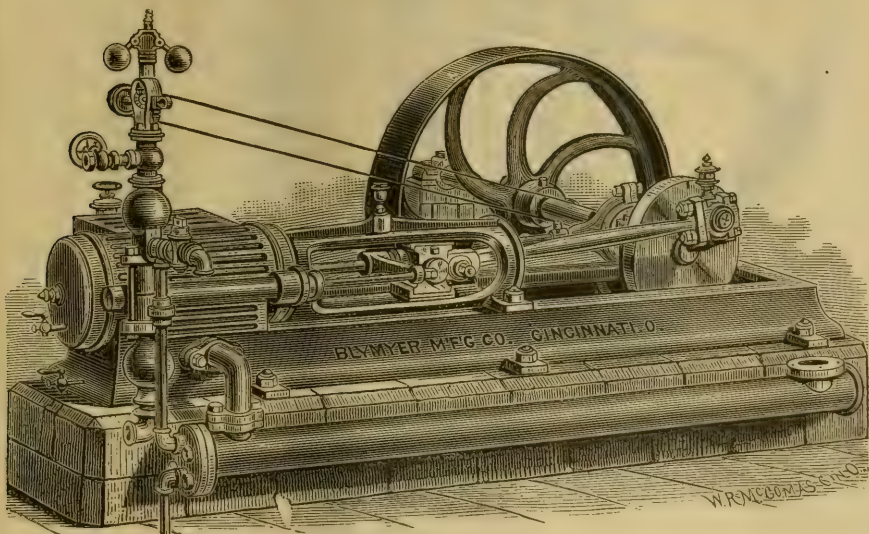
Our Steam Engine was awarded a Medal by the Centennial Exhibition, for "Proportions, Adjustment of Parts, Strength and Solidity."

Each Engine is put in actual operation, and thoroughly tested by working it up to its full power, and running for half a day before leaving our works.

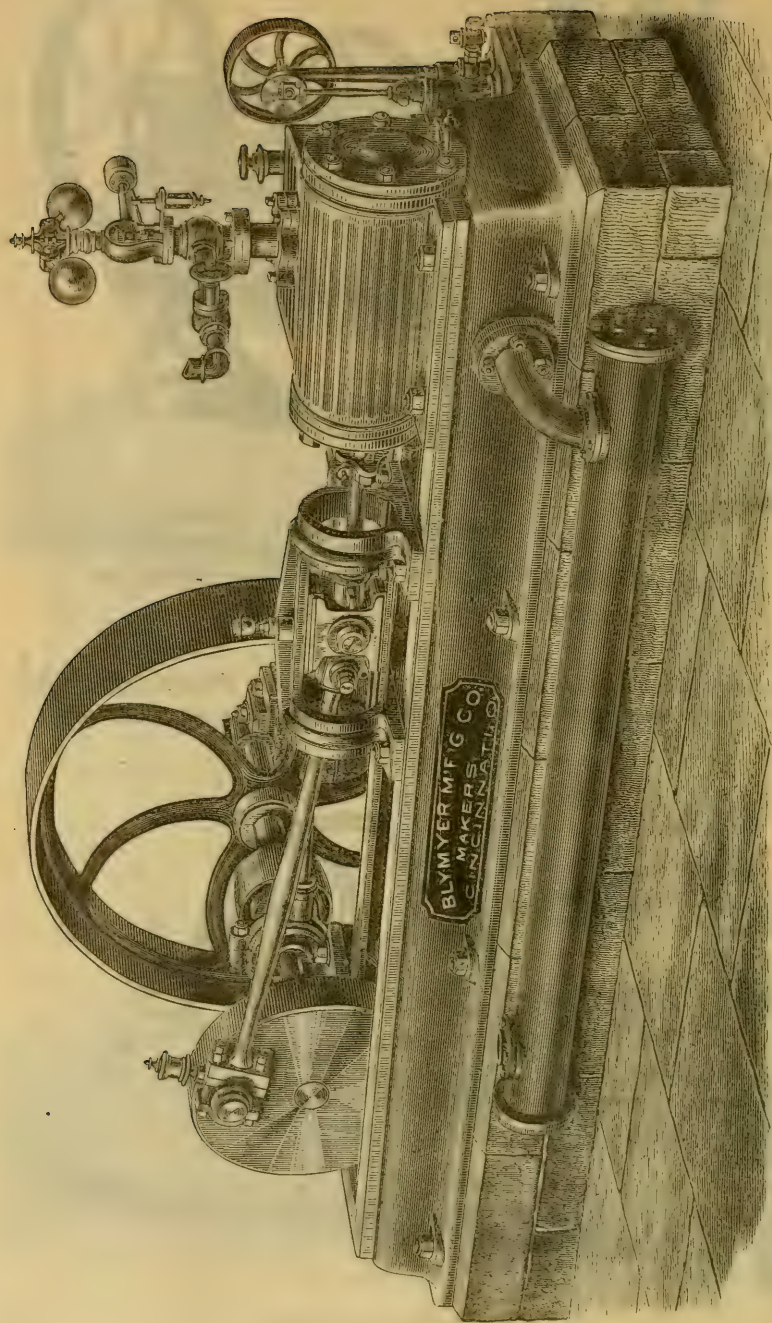


PORTABLE ENGINE ON SKIDS.

*Our Engines are not gotten up to compete in Price with cheaply built Engines.
They are designed to be the best of their class, to be excellent and safe.*



PLANTATION ENGINE.



STANDARD SLIDE VALVE STATIONARY STEAM ENGINE.

The engraving should show the *ends* of Steam Chest as well the *body covered*, as shown in engraving of Plantation Engine.

BLYMYER MANUFACTURING COMPANY,

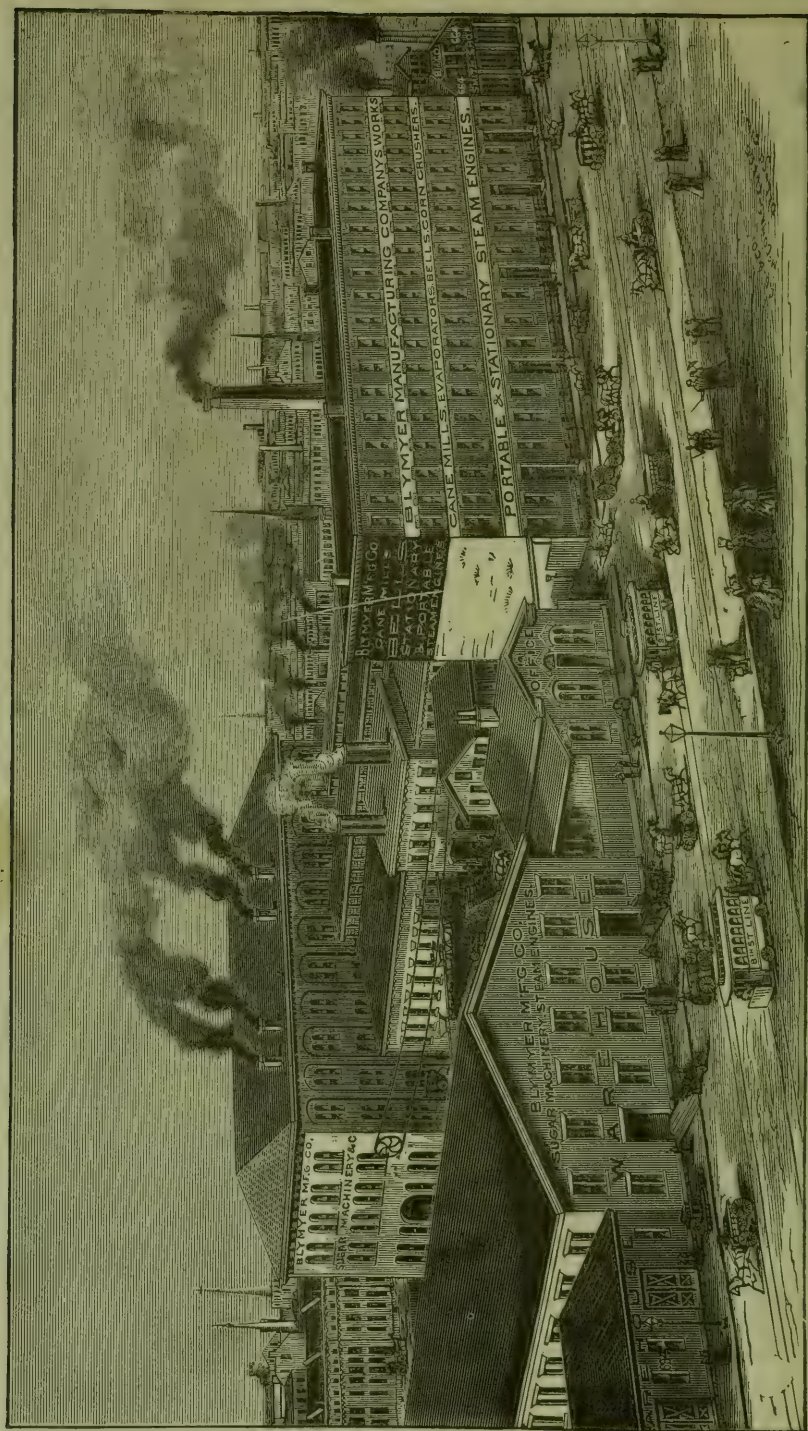
Steam Engines and Sugar Machinery.

Covering an entire square between Eighth and Ninth streets, and distant about one block from the Cincinnati Southern railroad depot, are the works of the Blymyer Manufacturing Company, manufacturers of Steam Engines, Sugar Machinery, &c. Their line of Steam Engines comprises fifteen sizes Stationary, five sizes Horizontal Portable, ten sizes Horizontal Portable on Skids, and three sizes Vertical. These Engines are sold in all parts of the South and West, and in Mexico and South America. They were awarded a medal at the Centennial Exhibition for "proportions, adjustment of parts, strength and solidity," and the gold medal, first premium, at the Cincinnati Exposition of 1879, after an extended and thorough working test of the engines in competition.

In Sugar Machinery the Blymyer Manufacturing Company has the largest and most complete line made by any establishment in the world. It embraces Mills for crushing sugar cane and sorgo, from the Niles Steam Mills, weighing as high as 50 to 100 tons, down to mills for one-horse power; Steam Sugar Trains, Vacuum Pans, and Sugar Evaporators of all sizes, for boiling the cane juice to syrup and sugar; and Centrifugals, for draining the sugar. An outfit for a first-class Sugar (Ribbon) Cane Plantation, consisting of Cane Mill, Engine and Boiler, Steam Train, Vacuum Pan, Centrifugal, &c., costs from \$20,000 to \$40,000. Smaller outfits, for working up the different varieties of Sugar Cane, including Early Amber and Sorgo, are sold at prices ranging from \$10,000 down to \$100 and less. Over five hundred of the Niles Steam Mills have been sold in Louisiana alone; and of the Victor Mills and Cook Evaporator, made only by the Blymyer Manufacturing Company, there are over 50,000 in use.

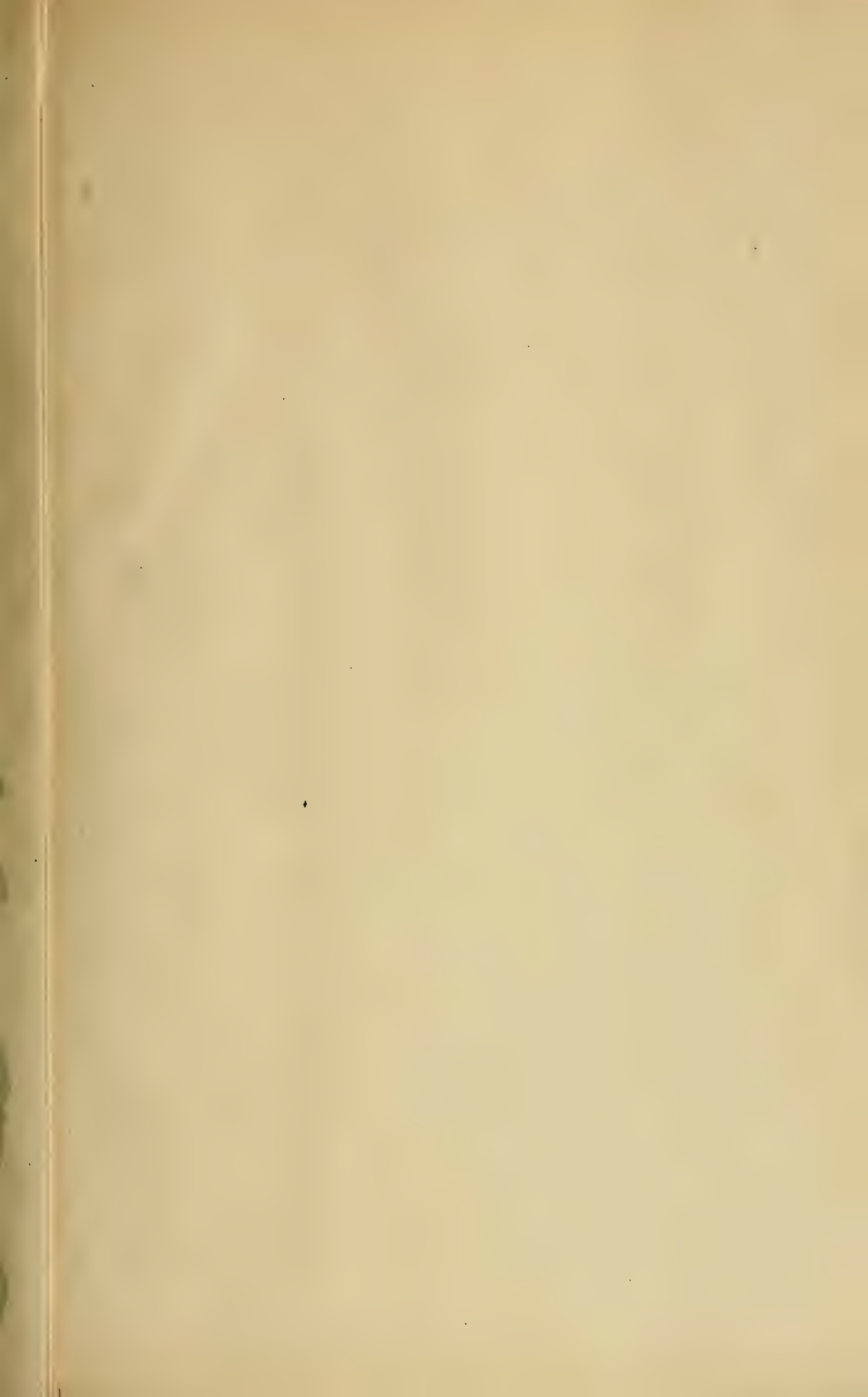
This Sugar Machinery was awarded a medal at the Centennial Exposition. The demand for it extends to all sections of the United States, where Sugar Cane and Sorgo are grown, Canada, Mexico, Central and South America, West Indies, Sandwich Islands, New Zealand, and Australia. Orders have been also received from France, Austria, India, and Africa. The Sugar Cane belt of this country extends from the northern line of Louisiana to our southern boundary. Sorgo is grown in every State and Territory. It is also largely grown in Canada. The Blymyer Manufacturing Company have for the past twenty-two years published an Annual called the Sorgo Hand-Book, which is the authority on Chinese and African Sugar Canes.

During the past year the Blymyer Manufacturing Company have been unable to fill their orders for either Steam Engines or Steam Sugar Machinery, although employing some two hundred and fifty men. They are now building extensive additions to their works, comprising a three-story brick machine shop, 50 by 150 feet and a boiler shop, 75 by 110 feet. These additions will increase the capacity of the works to 350 to 400 men. These works are equipped throughout with new and latest improved machinery and tools. The Blymyer Manufacturing Company have had established agencies in all of the Southern States since 1860. Their machinery is specially adapted to the wants of the South and West.



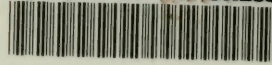
BLYMYER MANUFACTURING CO.'S WORKS, CINCINNATI, O.

Since the above engraving was executed, extensive additions have been made to the Works that do not appear in the engraving.





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